Forest Service

Forestry Research West

September 1999

A report for land managers on recent developments in forestry research at the three western Experiment Stations of the Forest Service, U.S. Department of Agriculture.

Forestry Research West

In This Issue

A Look at Research Natural Areas 3

Patents Used to Transfer Technology.....8

Historical Changes in a Managed Ponderosa Pine Forest.....10

New from Research.....14

Cover

The Hell's Canyon Research Natural Area (RNA) is one of 460 RNAs that represent some of the world's finest systems of natural areas. Read more about these unique and diverse ecosystems, beginning on page 3.

To Order Publications

Single copies of publications referred to in this magazine are available without charge from the issuing station unless another source is indicated. See page 15 for ordering cards.

Each station compiles periodic lists of new publications. To get on the mailing list, write to the director at each station (addresses on ordering cards)..

Permission to reprint articles is not required, but credit should be given to the Forest Service, U.S.D.A.

Mention of commercial products is for information only. No endorsement by the U.S.D.A. is implied.

Western Forest Experiment Stations

Pacific Northwest Research Station (PNW)
333 S.W. First Avenue
Portland, Oregon 97204

Pacific Southwest Research Station (PSW)
P.O. Box 245
Berkeley, California 94701

Rocky Mountain Research Station (RMRS)
240 West Prospect Road
Fort Collins, Colorado 80526-2098

Forestry Research West Writers and Editors:

Rick Fletcher
Rocky Mountain Research Station
240 W. Prospect Rd.
Ft. Collins, CO 80526

Dave Tippets
Rocky Mountain Research Station
324 25th St.
Ogden, UT 84401

Sherri Richardson
Pacific Northwest Research Station
333 S.W. First Ave.
Portland, OR 97204

Connie Gill
Pacific Southwest Research Station
P.O. Box 245
Berkeley, CA 94701

Dear Forestry Research West Readers,

Since *Forestry Research West* was first published in 1975, it has been an important source of information on recent developments in USDA Forest Service research in the western United States. Over the years, its readership has grown from Forest Service offices in the western U.S., to a vast audience spanning 40 countries. A recent reader survey shows strong support for *Forestry Research West* and the emphasis it places on research-related topics and issues.

However, owing to budget constraints, this September 1999 issue will be the last. We are focusing our resources in other directions that will improve and advance the services and products offered to our customers...services and products that help natural resource managers, policy makers, and scientists formulate wise natural resource policy to sustain and improve the productivity and health of public and private lands.

We, the writers and editors, thank you, our many readers and supporters of *Forestry Research West.* It has been a publication we take great professional pride in. We invite you to make use of the services listed on page 2 that are currently offered by the three western USDA Forest Service research stations. Should you wish to be added to the mailing list for future potential publications, please complete and return the card on page 15.

Sincerely,

Rick Fletcher
Managing Editor
Rocky Mountain
Research Station

Contributing Writers:

Dave Tippets
Rocky Mountain
Research Station

Connie Gill
Pacific Southwest
Research Station

Sherri Richardson
Pacific Northwest
Research Station

Rocky Mountain Research Station

- Web Site: ***http://www.xmission.com/~rmrs***
- Quarterly Publications List available from:
  Rocky Mountain Research Station
  Publications Distribution
  240 West Prospect
  Fort Collins, CO 80526
- Library services available at headquarters and most laboratory facilities.
- Additional information can be obtained by contacting:
  Public Affairs
  Rocky Mountain Research Station
  240 West Prospect
  Fort Collins, CO 80526
  (970) 498-1324 or
  (801) 625-5434

Pacific Southwest Research Station

- Web Site: ***http://www.psw.fs.fed.us***
- Quarterly Publications List available from:
  Pacific Southwest Research Station
  Publications Distribution
  240 West Prospect
  Fort Collins, CO 80526
  (970) 498-1719
- Library Services available from:
  The Knowledge Connection
  USDA Forest Service
  1323 Club Drive
  Vallejo, CA 94592
  (707) 562-8670
- Additional information can be obtained by contacting:
  Public Affairs
  Pacific Southwest Research Station
  PO Box 245
  Berkeley, CA 94701-0245
  (510) 559-6300

Pacific Northwest Research Station

- Web Site: ***http://www.fs.fed.us/pnw***
- Publication requests: (503) 808-2138
- Additional information can be obtained by contacting:
  Public Affairs
  Pacific Northwest Research Station
  333 S.W. First Avenue
  Portland, OR 97204
  (503) 808-2138

A Look At Research Natural Areas

By Tom Andrews
and
Rick Fletcher
Rocky Mountain Research Station

In 1927, in a rugged area of the Santa Catalina Mountains near Tucson, Arizona, the Forest Service established the Santa Catalina Research Natural Area (RNA) for the conservation and study of native flora. Since those early days, over 460 RNAs have been designated. Over half of these (262 areas totalling over 350,000 acres) occur within the territory of the Rocky Mountain Research Station, a region that covers most of the Rocky Mountain and Intermountain West as well as many Great Plains states. Ranging in size from a few to nearly 20,000 acres, Forest Service RNAs arguably comprise one of world's finest systems of "natural areas".

Mad Creek Research Natural Area, Routt National Forest, CO. The "ribbon forest" look is primarily caused by wind and snow patterns.

Old growth forests, alpine summits, rolling prairie, oak-covered hillsides, peat bogs, and lush riparian areas are all represented within the RNA system. The diversity and representativeness of the RNA system make it unique among natural area systems in the United States. Originally designed to include excellent examples of all Society of American Forester (SAF) cover-types and Kuchler vegetation types, RNAs are now usually selected to represent a broad range of the ecological diversity on National Forest System land. The 500-plus plant associations identified within the Rocky Mountain Region are used as targets for inclusion in the RNA system. RNA planning is also being done to insure that the diversity within ecoregional boundaries is well represented.

The representativeness of the RNA system gives it great significance in the arena of biological diversity protection. As a showcase for the diversity of ecosystems in America, the RNA system has become an important part of our nation's natural heritage. With the increasing intensity of the human enterprise across the globe, the distinctiveness and value of these natural areas will inevitably increase with time. Many RNAs are also home to a large number of threatened, endangered and sensitive species. However, in addition to recognizing the intrinsic value of RNAs as natural areas, there is a strong utilitarian motivation in the Forest Service to put the RNA system to good use.

As well as being biodiversity reserves, RNAs play other substantial roles in achieving the Forest Service mission, which is embodied in our agency's Natural Resource Agenda. First, most RNAs are relatively pristine with naturally functioning ecological processes, making them useful for many forms of basic ecological research. Second, RNAs provide reference conditions or benchmarks for comparison with more impacted areas. This second use forms the strongest connection with the Natural Resource Agenda, which emphasizes maintaining ecological sustainability.

RNAs as Reference Conditions

How will we know that soil or biota or productivity on timber or grazing lands are being maintained, if there are no controls for comparison, no ecologically similar lands not being grazed, logged, or otherwise subject to intense human use? Aldo Leopold recognized the need for controls over 50 years ago when he wrote in the *Sand County Almanac*: "In many cases we literally do not know how good a performance to expect of healthy land unless we have a wild area for comparison with sick ones. In short, all available wild areas, large or small, are likely to have value as norms for land science." Without reference conditions or index sites, we have no baselines for separating the impacts of human use from the impacts of changing weather patterns and

Decades of fire suppression have resulted in thick stands of ponderosa pine and Douglas-fir on the Sawmill Creek Research Natural Area, Bitterroot National Forest, MT. Restoration is underway to thin and reintroduce fire into this ecosystem.

other natural phenomenon. The ecological diversity of the RNA system makes it particularly useful for these comparisons. Also, fundamental research on the impacts of global climate change can benefit by monitoring ecological change across a wide range of naturally functioning ecosystems such as RNAs.

> ***"In short, all available wild areas, large or small, are likely to have value as norms for land science."***

The Forest Service is currently making a strong research effort to understand and measure sustainability. Monitoring systems are being expanded and new ones created and tested. There has been recent discussion within the Forest Health Monitoring group about the value of extending systematic monitoring to include RNAs, Long Term Ecological Research sites and other protected areas. For many RNAs throughout the United States, extensive baseline data, permanent plots, and research projects from many disciplines have already contributed to the ecological knowledge necessary to help implement the Natural Resource Agenda. Basic ecological research, long-term ecological monitoring and biodiversity protection on RNAs are synergistically woven together in the value RNAs provide to the Forest Service.

Ecological Restoration on RNAs

We have been discussing Research Natural Areas as if they were isolated from human influence. In some critical regards we know this not to be true. Non-native noxious weed species are nearly ubiquitous in certain parts of the country; and the impacts of decades of fire suppression have left some forest types unnaturally crowded and susceptible to catastrophic fire. Because some RNAs have also not escaped these influences, these sites can and have become laboratories for ecological restoration.

For instance, on the margins of the Bitterroot Valley of Montana, the Sawmill Creek RNA represents open stands of old-growth ponderosa pine intermixed with montane grasslands. Mick Harrington from the Rocky Mountain Research Station's Fire Sciences Lab in Missoula, Montana, has been working with the Bitterroot National Forest to restore these old forests to a more natural condition. "Decades of fire suppression have produced an unnaturally dense understory of shade tolerant, disease-prone trees," he says. "Prior to this century these small trees would not have survived the regularly occurring surface fires that were ignited by lightning and Native Americans. Only in recent years have we come to understand the role of periodic fire in maintaining the stands of old ponderosa pine trees with infrequent pine regeneration that formerly covered much of the landscape in this region," says Harrington.

Following the completion of public participation in an environmental assessment for this project, the Bitterroot National Forest will begin thinning some of the understory trees in the Sawmill Creek RNA this year. The purpose of this thinning will be to lessen the severe competition with the old ponderosa pine and reduce the unnaturally high fire hazard, a condition that fire alone can no longer achieve. "Neither of these conditions would exist today had the natural fire process continued in the last 80 years," says Harrington. The thinning is a necessary preparation for a prescribed fire that will leave the forest and grassland in a more natural condition by reducing the high level of fuels, opening the stand, and stimulating the herbaceous and shrubby species. Harrington will be monitoring the effects of this restoration management in conjunction with noxious weed control in the grasslands which has been directed by Peter Rice of the University of Montana. The proposal for this project was a recipient of a Chief's Natural Resource Agenda Grant.

Fire History

In addition to the work on Sawmill Creek, ponderosa pine stands on other RNAs in South Dakota, Wyoming, and Colorado are producing detailed records of fire frequencies that date back hundreds of years. The base of ponderosa pine trees is often scarred by regularly occurring surface fires. The science of dendrochronology has perfected techniques for using the accumulated record of fire scars in combination with annual tree ring data to assemble a long history of fire occurrences in these pine forests. Mike Ryan, the former RMRS RNA Coordinator, along with Tom Andrews, collaborated with Peter Brown, a former Station scientist, who conducted these studies. This research provides basic information about how natural processes have molded these ecosystems, which is critical for their future management. Similarly, RMRS scientist Merrill Kaufmann, the current RNA Coordinator for the Station, has launched an extensive research program within the natural landscape of ponderosa pine forest surrounding Cheesman Lake on the South Platte River in central Colorado. Kaufmann's research will provide an understanding of forest landscape structure and dynamics that will help guide the management of the ecologically sensitive watershed for the City of Denver's water supply and other similar areas for decades to come.

RNA Research

In the Black Hills of South Dakota, the Upper Pine Creek RNA has been the subject of intensive study for many years by RMRS scientist John Lundquist. He has used the reference conditions of the Upper Pine Creek RNA as part of a larger research study to understand the role of small-scale insect, disease, and fire disturbances on ponderosa pine stand structure and larger scale ecosystem patterns and processes. This fundamental research is also intended to produce results that will be useful in Forest Planning for the Black Hills National Forest.

Outlying stands of limber pine dot the short-grass prairie of the Daves Draw Research Natural Area, Pawnee National Grasslands, CO.

There are many other examples of valuable research projects that have been completed on RNAs by the Rocky Mountain Research Station. To name just a few: the use of permanent plots by scientists from the Provo, Utah, Shrub Lab to determine long-term successional relationships in rangelands on the Elk Knoll RNA in Utah; Anna Schoettle's research on bristlecone pine physiology in Daves Draw and Mt. Goliath RNAs in Colorado; Robin Tausch's studies on pinyon-juniper ecosystems in the Jack Springs Pinyon RNA in Nevada; and the use of several RNAs by the Wildlife Habitats Research Work Unit as reference areas for comparing the impacts of timber harvest on breeding bird populations.

Despite the work to date, the Station acknowledges that these efforts only scratch the surface of the research potential of the RNA system and the value that RNAs will have for science in the future. During this year the Station will develop an RNA website to display information on its 262 RNAs. Hopefully, this information will attract other research to these natural areas, including the work of university scientists. The accumulated results of research focused upon a single site have the potential for greatly extending our understanding of how ecosystems function. With this accumulated scientific knowledge, as well as the results of systematic monitoring from natural areas, the Forest Service and other land management agencies will have better tools for the sustainable management of public lands.

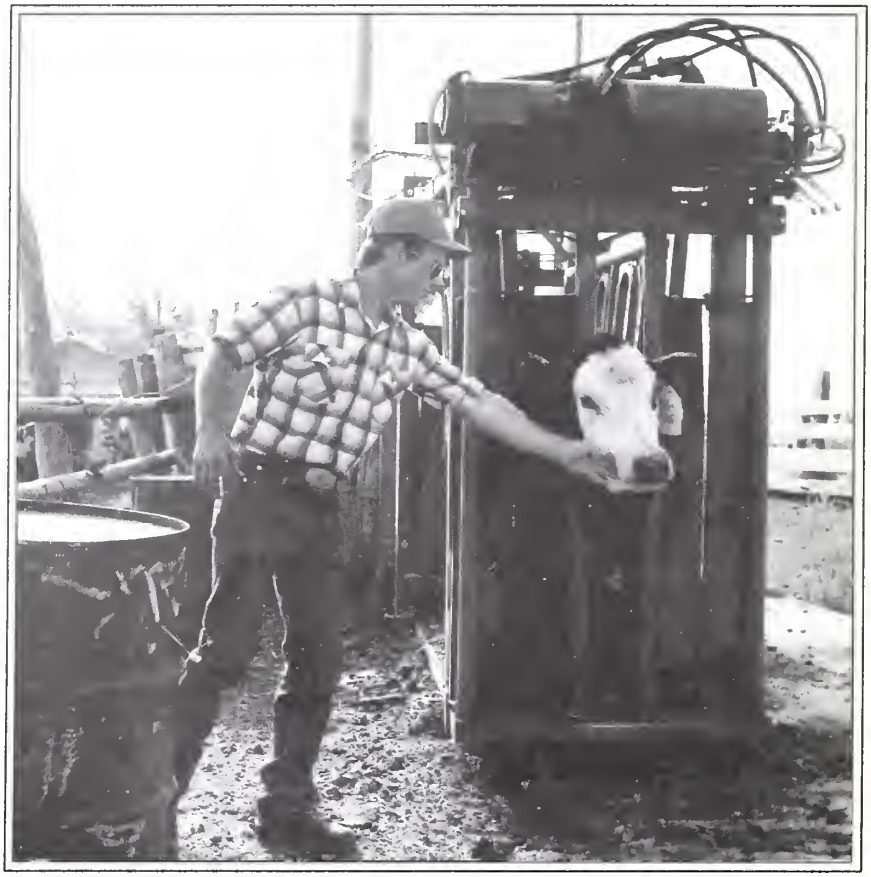
Patents Used to Transfer Technology

By Sherri Richardson
Pacific Northwest Research Station

The government has been in the patent business for a long time. But the Forest Service has only recently begun to use patents as a way to transfer technology. Since the passage of the Technology Transfer Act of 1986, all Federal agencies are required to consider patenting inventions as a means for transferring technology from Federal agencies.

"We have been using patents as a technology transfer tool since the 1980s," says Janet Stockhausen, a patent attorney and advisor for the Forest Service. "The laws have changed to give the Federal Government the ability to grant exclusive licenses. Before that, only nonexclusive licenses were available, and that left the field open so that you could have lots of people producing the same product. The licensee did not have exclusive control over his or her product."

The Forest Service has issued 131 patents since 1980, according to Stockhausen. And more are being granted. "More and more scientists are finding out about the patent process and are using it," she says. "I encourage scientists to look into it." Patents serve as a method for the Forest Service to document research accomplishments. Also, patent licenses help to promote the transfer of technologies to the private sector for commercial markets.



A rancher installs an electronic eartag on a heifer. Station scientist Tom Quigley and retired Station scientists Art Tiedemann and Jack Ward Thomas devised the tag and share patent rights.

"More and more scientists are finding out about the patent process and are using it."

Stockhausen shared a few tips about the basics of obtaining a patent:

What is a patent?

It's an instrument by which the U.S. Government grants the inventor the exclusive right to make, use, or sell an invention for a term of years. It costs the Forest Service about $15,000 to $30,000 to obtain a patent, so the marketability of an invention must be demonstrated before initiating the process.

Texas yearling steer wears insulated electronic eartag.

What happens with the income generated from a patent?

Forest Service inventors are entitled to share collectively the first $2,000 plus 25 percent of the income thereafter received by the agency from each licensed invention up to a maximum of $150,000 per invention per year per inventor.

How long does it take for a patent to be granted?

About 2 years.

For detailed information about obtaining a patent, contact Stockhausen and request the booklet, *Forest Service Patent Primer*. Stockhausen can be reached by e-mail at jstockhausen/fpl or phone (608) 231-9502. Write her at Patent Program, USDA Forest Service, One Gifford Pinchot Drive, Madison, WI 53705-2389.

Historical Changes in a Managed Ponderosa Pine Forest

Compiled by
Rick Fletcher
Rocky Mountain
Research Station

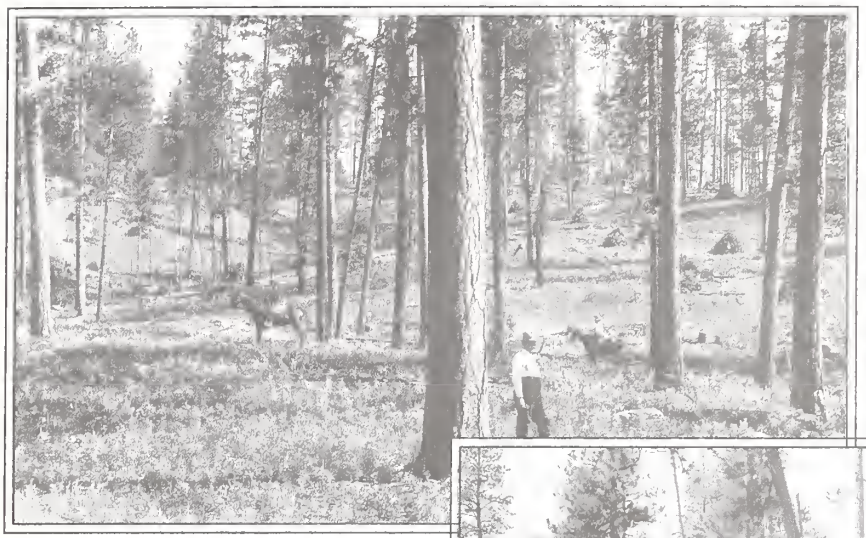
In much of forested North America, there is little reliable information on changes in vegetation over long periods. An exception is the Lick Creek drainage on the Bitterroot National Forest in western Montana, thanks to the foresight of USDA Forest Service personnel who have photographically recorded vegetation over the 88 years between 1909 and 1997. This photographic series provides a unique opportunity to visually interpret changes in a ponderosa pine/inland Douglas-fir forest. Changes depicted also allow an evaluation of how resource values have been influenced by logging and exclusion of fire.

The 1909 photographs were taken at 13 different points on the ground during the Lick Creek Timber Sale, a silvicultural partial cutting that constituted the first large ponderosa pine timber sale in what is now the Northern Region of the USDA Forest Service. Gifford Pinchot, first Chief of the Forest Service, provided direction for this sale. In the 1920's, the photopoints were relocated, permanently marked, and rephotographed. Thereafter, the photographs were retaken every decade. These photo series, which allow readers to witness structural and other ecological changes associated with forest management and fire suppression since the early 1900's, are available in a new publication just issued by the Rocky Mountain Research Station titled *Eighty-Eight Years of Change in a Managed Ponderosa Pine Forest*, General Technical Report RMRS-23. Ecologist Trainee Helen Smith and Research Forester Stephen Arno, with the Station's Fire Sciences Laboratory in Missoula, Montana, are editors.

The 88-year photo sequences, descriptions of historical changes, and the initial results from ecosystem-based management treatments conducted at Lick Creek in the early 1900's portray a dynamic, ever-changing forest. Evidence shows that, despite repeated silvicultural cuttings since the early 1900's, thickets of understory conifers, down woody fuels, and litter fuels tend to increase in the absence of fire. Similarly, old-growth ponderosa pine/Douglas-fir stands show dramatic increases in understory conifers and fuel accumulation with fire exclusion.

The report highlights past and ongoing studies at Lick Creek that focus on a return to stand structures that are sustainable and consistent with historical fire occurrence in the area. Silvicultural cutting treatments, combined with different prescribed burn strategies applied to help maintain healthy multiaged stands of ponderosa pine and set an example of treatments for the millions of acres of similar forests elsewhere in the western U.S., are covered.

It is a daunting challenge to restore the fire-dependent forest at Lick Creek," says Arno. "Fuels have accumulated, trees may be experiencing growth stagnation related to overstocking and lack of sufficient nutrient cycling, and



This 1909 photo shows a light selection cut in open ponderosa pine. Ground cover is comprised of perennial grasses and forbs.

By 1938, several pines have been cut, some died, and others have fallen to the ground. Ponderosa pine and Douglas-fir regeneration is profuse. Slash and windfall have resulted in an increase in heavy fuels.

In 1958, young ponderosa pine and Douglas-fir dominated the skyline. Heavy ground fuels showed considerable decomposition.

Precommercial thinning and pruning in 1968 removed mature pines and opened up young pine stands. Slash has added to heavy fuels, while down material is more decomposed.

Eighty years after the first photo, growth of trees in the foreground has reduced the view. A few bitterbrush plants can be seen in the center of the stand, along with some grasses.

Thinning in 1992 has created large openings throughout the stand. Mid- and back-ground received burn treatment in 1993 resulting in loss of small trees.

fine roots may be growing close to the soil surface and thus vulnerable to fire damage. Invasive nonnative plants are established and likely to increase with any disturbance," he says.

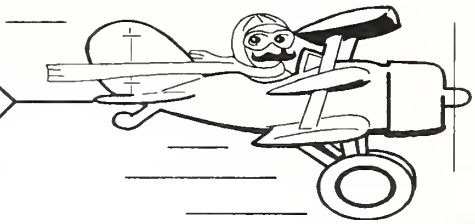
Despite these challenges, Arno and Smith believe that research at Lick Creek and other areas suggests that even well-designed silvicultural cuttings, not accompanied by fire, are inadequate for sustaining wildland ponderosa pine/Douglas-fir ecosystems. "Prescribed fire can control the excessive number of saplings and reduce surface fuels, recycle nutrients in a semblance of natural processes, and reduce the risk of severe wildfire," they say.

Arno cautions that because of the excessive stocking of mid-sized trees, returning fire without a prepatory silvicultural cutting would either be ineffective or too destructive (causing mass mortality). Once the initial restoration treatments have been completed, however, it should be easier to maintain the stand in some semblance of natural structure at low risk to severe wildfire, or insect/disease epidemics by continuing use of prescribed fire.

To date, the ecosystem-based management treatments applied at Lick Creek have produced an array of changes, from significant to subtle, from transient to long-term, some of which would be considered positive and some negative. Cutting prescriptions, combined with fire treatments, have opened stand structures and removed the Douglas-fir understory. Natural conifer regeneration appears successful within the burn treatments, producing microsites more favorable to ponderosa pine. The fire hazard has been reduced by consumption of surface fuels and the reduction of ladder fuels. The general increase in understory herbaceous and shrubby plant cover is also a positive response. Some bird species decline with treatments, some were unchanged, and others increased. These changes are likely to be temporary. An aesthetic decline was indicated with harvesting and burning, but as the forest recovers, an increase in acceptance is expected.

Arno believes that ecosystem-based management projects of this scale - a few hundred acres being accomplished over 2 years - are attainable by the Forest Service and acceptable to the public. "However," he adds, "this scale of treatment needs to be greatly expanded to restore and maintain any substantial fraction of the ponderosa pine forest on National Forest lands in this region. There is a real need for large-scale restoration treatments, including prescribed burning," says Arno. The long-term records from Lick Creek, coupled with evaluations and research on the 1990's ecosystem-based management treatments, should provide valuable insight for planning such restoration efforts elsewhere in ponderosa pine forests."

If you would like a copy of *Eighty-Eight Years of Change in a Managed Ponderosa Pine Forest*, contact the Rocky Mountain Research Station. Use the ordering cards near the back of this issue of *Forestry Research West*. Supplies are limited.



Monitoring for the Northwest Forest Plan

The following four publications from the Pacific Northwest Research Station focus on effectiveness monitoring for the Northwest Forest Plan. The Northwest Forest Plan is a large-scale ecosystem management plan for Federal lands in the Pacific Northwest, encompassing 24 million acres of federally managed forests, over 18 National Forests and 7 Bureau of Land Management Districts in northern California, western Oregon, and western Washington.

The Strategy and Design of the Effectiveness Monitoring Program for the Northwest Forest Plan, General Technical Report PNW-437.

This report describes the logic and design of an effectiveness monitoring program for the Northwest Forest Plan. The program is prospective, providing an early warning of environmental change before irreversible loss has occurred. Essential components needed for program implementation, such as data collection, information management, report preparation, and feedback to management, are discussed. This discussion includes information for staffing, funding, and establishing a long-term commitment for a large, interagency monitoring program.

Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan, General Technical Report PNW-440.

This publication describes options for effectiveness monitoring of long-term status and trends of the northern spotted owl to evaluate the success of the Northwest Forest Plan in arresting downward population trends, and in maintaining and restoring the habitat conditions necessary to support viable owl populations on Federal lands. A process to report status and trend results is presented that could provide a reference document for decisionmakers during periodic land use plan reviews.

Late-Successional and Old-Growth Forest Effectiveness Monitoring Plan for the Northwest Forest Plan, General Technical Report PNW-438.

This report presents options for long-term effectiveness monitoring of late-successional and old-growth forests under the Northwest Forest Plan. It describes methods to answer questions about how much late-successional forest exists on Federal land, its pattern, how it's changing, and if the Forest Plan is providing for its conservation and management. A periodic process for reporting the status and trend of late-successional and old-growth forests on Federal lands is described, and links to finer scale monitoring of silvicultural and salvage effects on late-successional and old-growth forests are provided.

To order any of the publications listed in this issue of Forestry Research West, use the order cards below. All cards require postage. Please remember to use your Zip Code on the return address.

Please send the following Pacific Northwest Station publications: (Circle the number)

1) *The Strategy and Design of the Effectiveness Monitoring Program*...General Technical Report PNW-437.

2) *Northern Spotted Owl Effectiveness Monitoring Plan*...General Technical Report PNW-440.

3) *Late-Successional and Old-Growth Forest Effectiveness*...General Technical Report PNW-438.

4) *Marbled Murrelet Effectiveness Monitoring Plan*...General Technical Report PNW-439.

Send to: _____

_____

_____

Please send the following Rocky Mountain Research Station publications: (Circle the number)

1) *Monitoring Inter-Group Encounters in Wilderness,* Research Paper RMRS-14.

2) *Revegetation with Native Species,* Proceedings RMRS-8.

3) *Cooperative Strategies for Forest Science Management*...Proceedings RMRS-6.

4) Other _____

Send to: _____

_____

_____

Please send the following Rocky Mountain Research Station publications: (Circle the number)

1) *Monitoring Inter-Group Encounters in Wilderness,* Research Paper RMRS-14.

2) *Revegetation with Native Species,* Proceedings RMRS-8.

3) *Cooperative Strategies for Forest Science Management*...Proceedings RMRS-6.

4) *Eighty Eight Years of Change in a Managed Ponderosa Pine Forest*, General Technical Report RMRS-23.

Send to: _____

_____

_____

Please add my name to the mailing list for future publications from the four western experiment stations of the USDA Forest Service.

Name _____

Address _____

_____

_____

E-Mail Address: _____

STAMP

Rocky Mountain Research Station
3825 East Mulberry
Fort Collins, Colorado 80524

(Attn: Publications Distribution)

STAMP

Pacific Northwest Research Station
333 S.W. First Avenue
Portland, Oregon 97204

(Attn: Publications Distribution)

STAMP

Rocky Mountain Research Station
240 West Prospect Rd.
Fort Collins, Colorado 80526

(Attn: Public Affairs)

STAMP

Rocky Mountain Research Station
3825 East Mulberry
Fort Collins, Colorado 80524

(Attn: Publications Distribution)

Marbled Murrelet Effectiveness Monitoring Plan for the Northwest Forest Plan, General Technical Report PNW-439.

This report describes options for effectiveness monitoring of long-term status and trends to evaluate the success of the Northwest Forest Plan in maintaining and restoring marbled murrelet nesting habitat and populations on Federal lands. A two-phase approach is described. The potential use of predictive models to evaluate the relation between terrestrial habitat use and conditions and population densities and trends is described along with a process for data analysis and reporting.

Monitoring Inter-Group Encounters in Wilderness

Resource managers often face the challenge of monitoring rates of visitor encounters in wilderness. This new report describes a study on: 1) estimating encounter rates through use of several monitoring methods; 2) determining the relationships between the various measures of encounter rates; and 3) determining the relationships between various indirect predictors of encounter rates and actual encounter rates. Exit surveys, trip diaries, wilderness ranger observations, trained observers, mechanical counters, trailhead count observations, and parking lot vehicle counts were used to develop a better understanding of the relationships between these various monitoring methods.

Scientists found that encounter rates differed dramatically from weekdays to weekend days at high-use places. Estimates of encounter rates also varied substantially across methods used. Rather than conclude what method is best, this report seeks to help the manager decide which method is most appropriate for use in a particular wilderness, given the issues being addressed. It will also help alleviate some of the problems managers have in prescribing monitoring systems, by forcing more precise definition of indicators.

Request your copy of ***Monitoring Inter-Group Encounters in Wilderness***, Research Paper RMRS-14, from the Rocky Mountain Research Station. Supplies are limited.

Revegetation with Native Species

The Rocky Mountain Research Station has just issued the proceedings from the 1997 annual meeting of the Society for Ecological Restoration, held in Fort Lauderdale, Florida. The seven papers in this proceedings address the current state of knowledge and application of ecological restoration in the western United States. They provide an overview of: 1) rangeland revegetation lessons as they apply to ecological restoration today; 2) USDI National Park Service, USDA Natural Resources Conservation Service, and Forest Service restoration strategies and perspectives; 3) biological factors for using native plant species; and 4) the challenges of native seed collection, production, and marketing.

Copies of the proceedings, ***Revegetation with Native Species***, Proceedings RMRS-8, are available from the Rocky Mountain Research Station while supplies last.

FORESTRY RESEARCH WEST
U.S. Department of Agriculture
Forest Service
240 West Prospect Rd.
Fort Collins, Colorado 80526

Official Business
Penalty for Private Use, $300